atlas

UNDERSTANDING DEEP ATLANTIC ECOSYSTEMS

Ocean Circulation over Formigas and Ormonde Seamounts

3rd ATLAS General Assembly, 9th – 13th April 2018

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 678760 (ATLAS). This output reflects only the author's view and the European Union cannot be held responsible for any use that may be made of the information contained therein.

Outline

1. Introduction
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1. Introduction

Seamounts

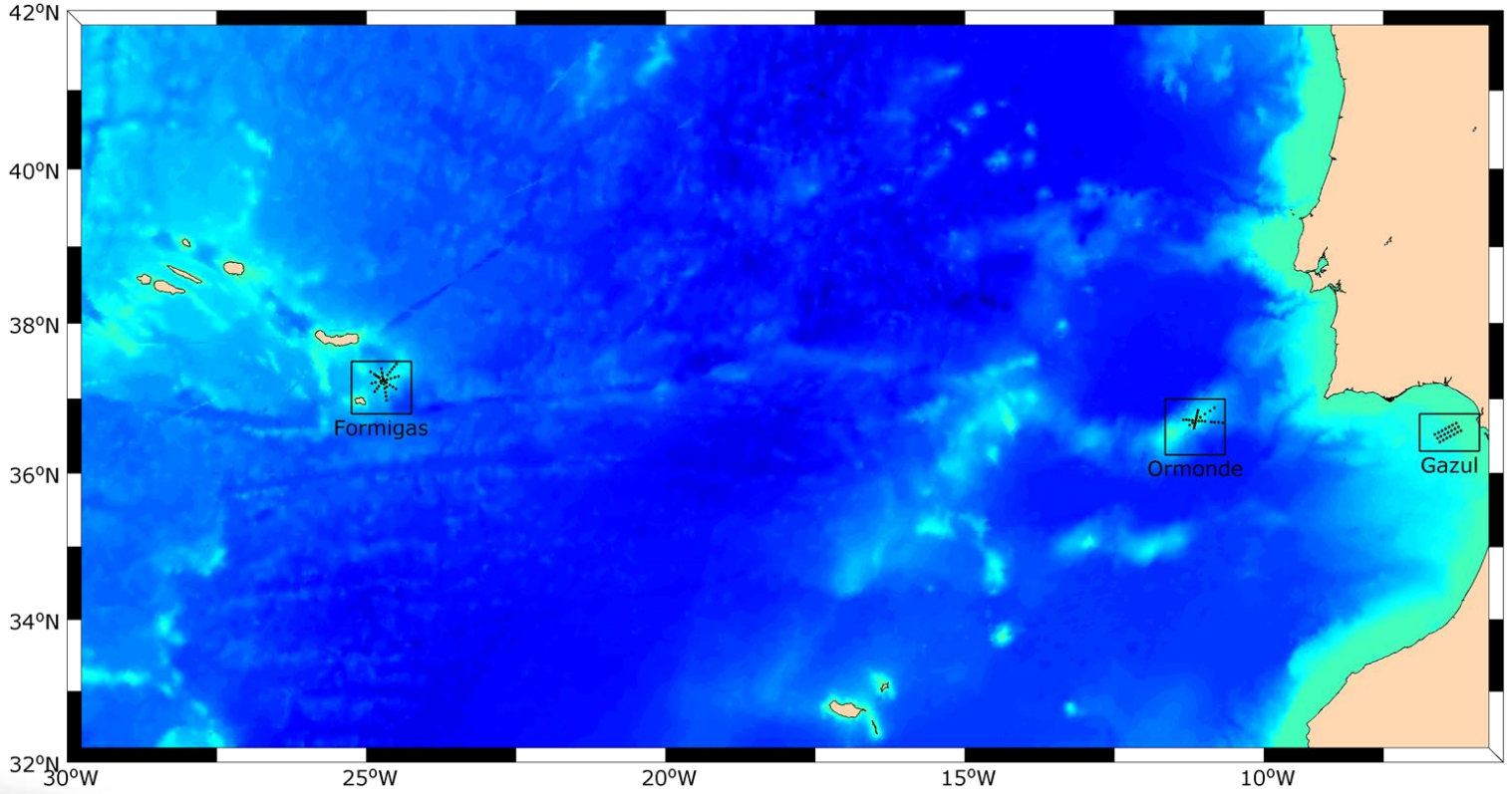
Obstacle to the ocean flow

Good conditions for the settle of corals

Cold-water corals of Mediterranean origin in the Atlantic

Objective: determine the influence of the water mass distribution on the settlement of cold-water corals over seamounts

1. Introduction



Stations location

2. Methodology

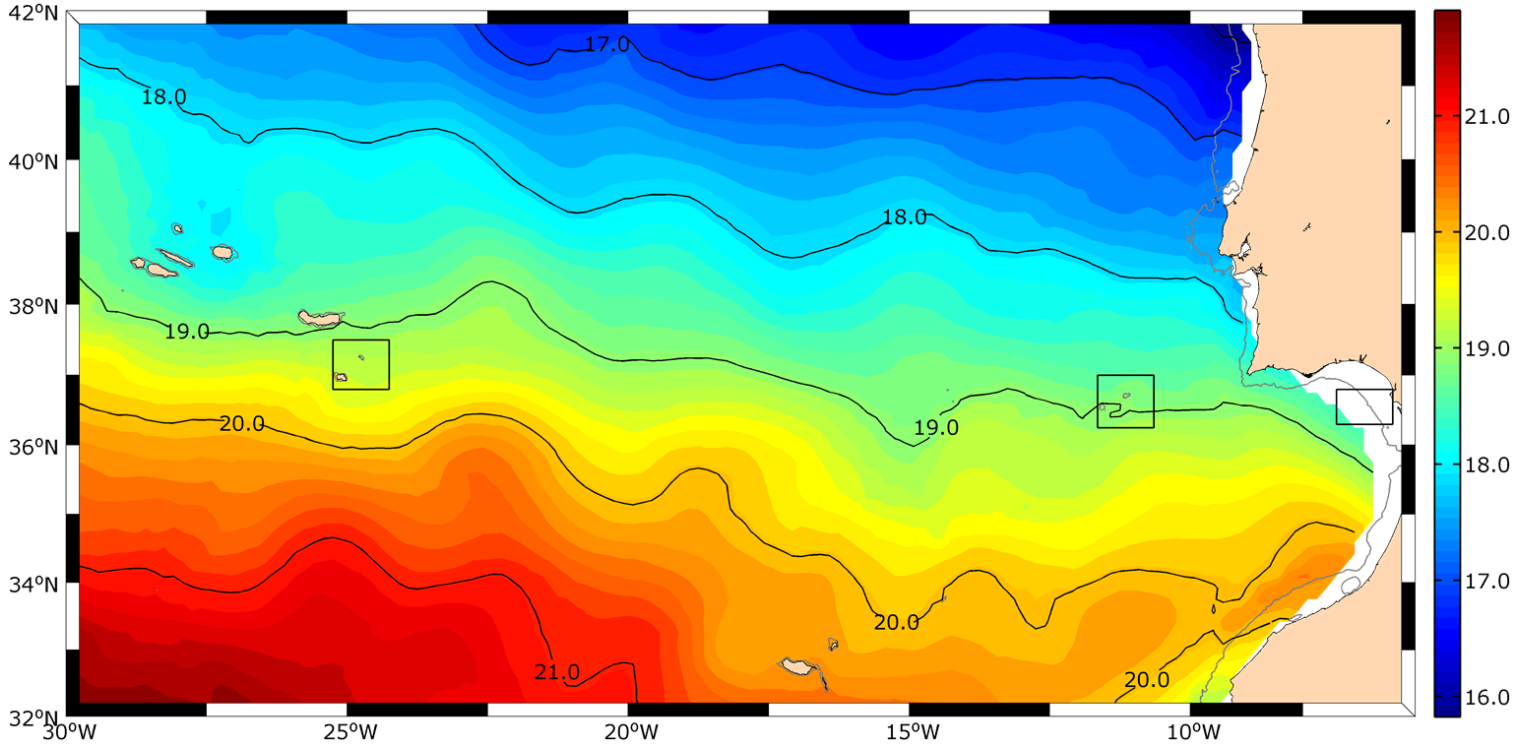
Historical Data

- Argo Temperature Climatology
- Annual Means of Drifter Data
- Climatological Monthly Means Drifter Data
- NOAA High Resolution SST Data
- ICOADS 1-Degree Enhanced

Field Data

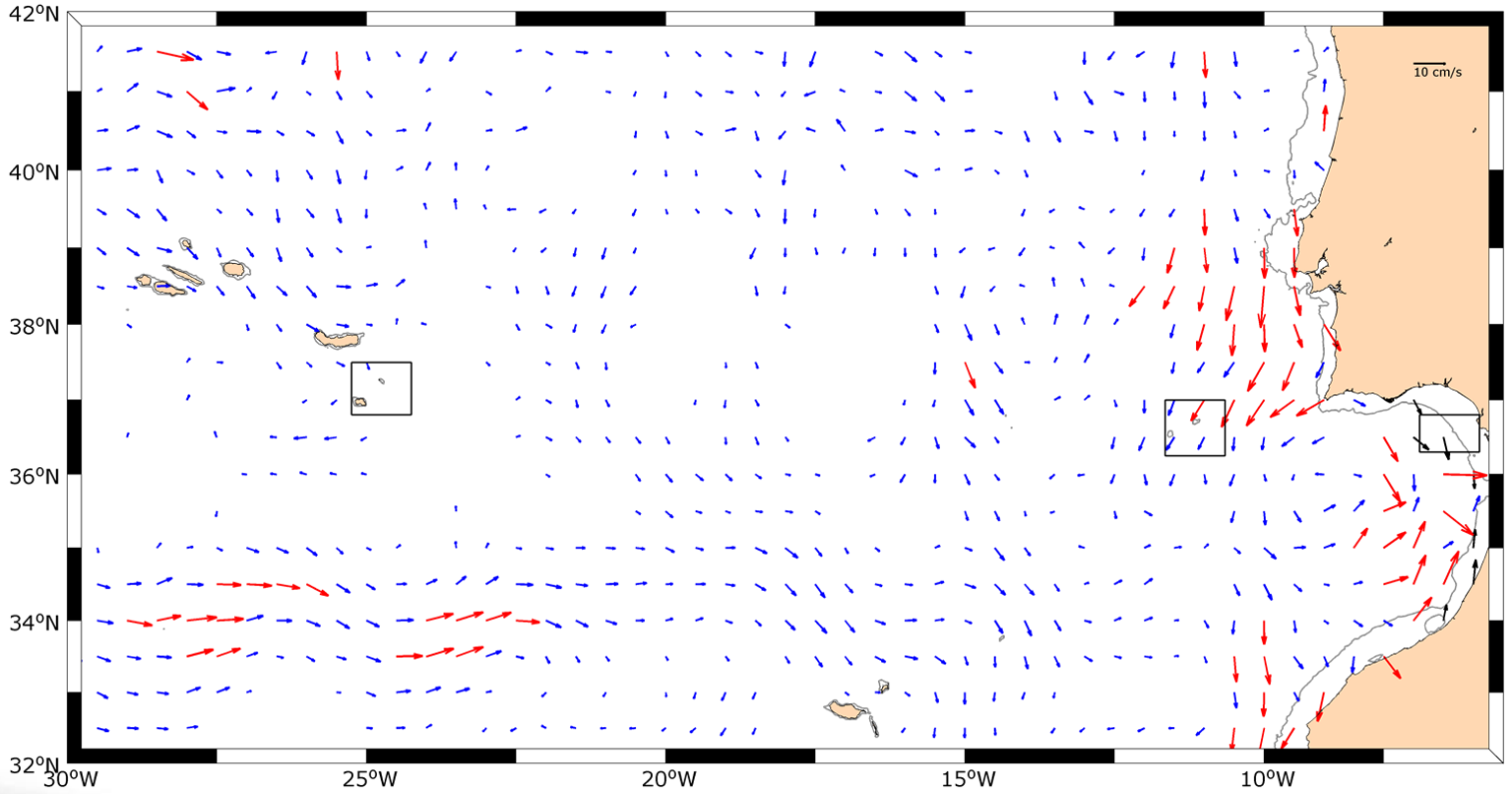
- CTD
- LADPC
- Biochemical

3. Results: Overview



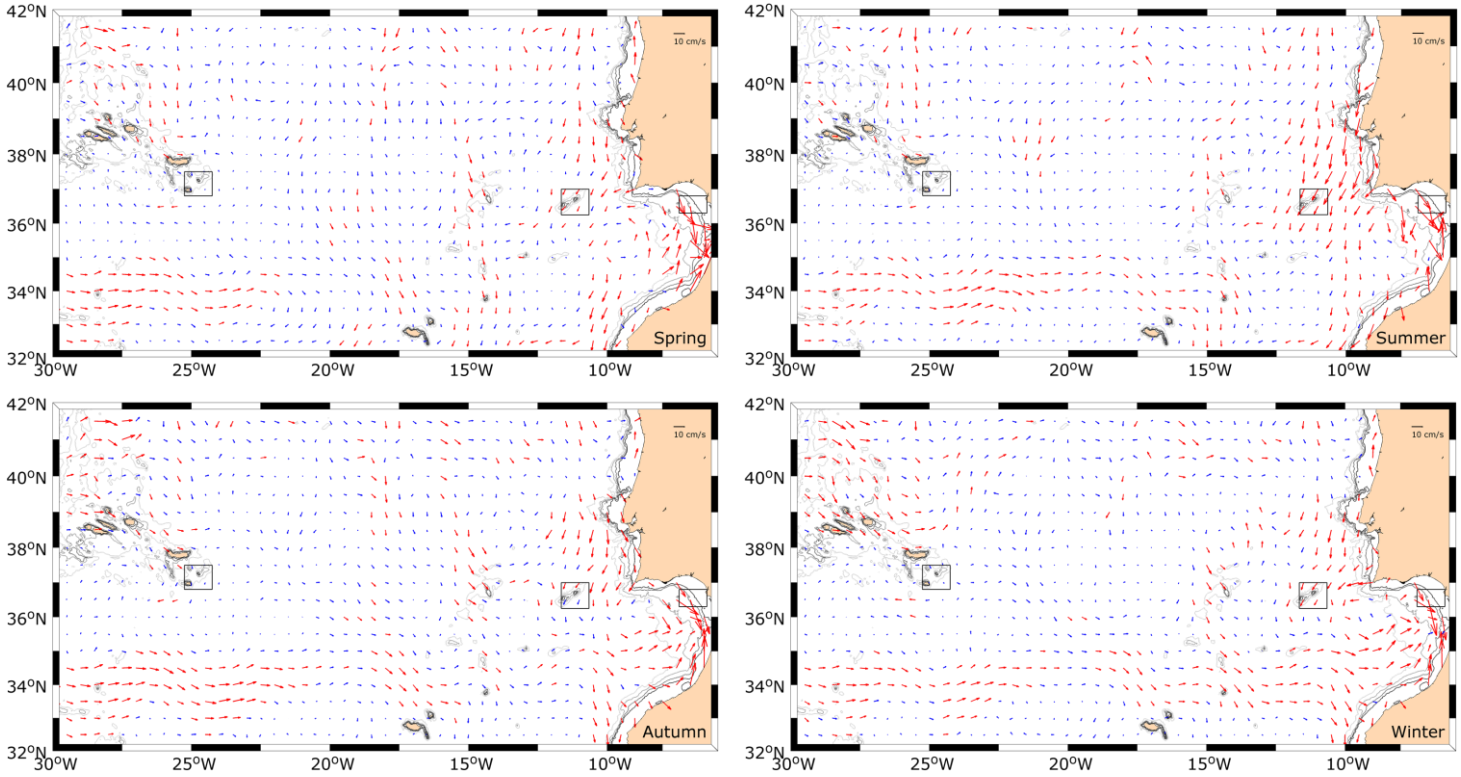
Mean annual temperature

3. Results: Overview



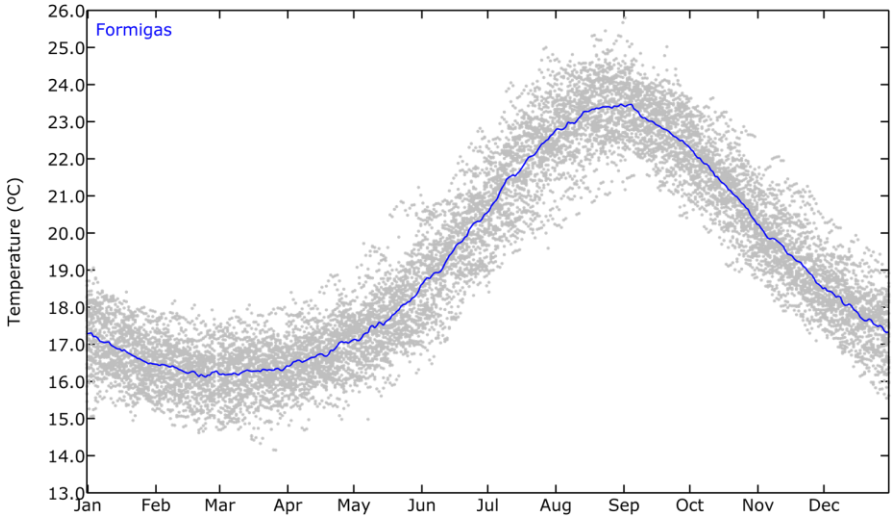
Near-surface current velocities

3. Results: Overview



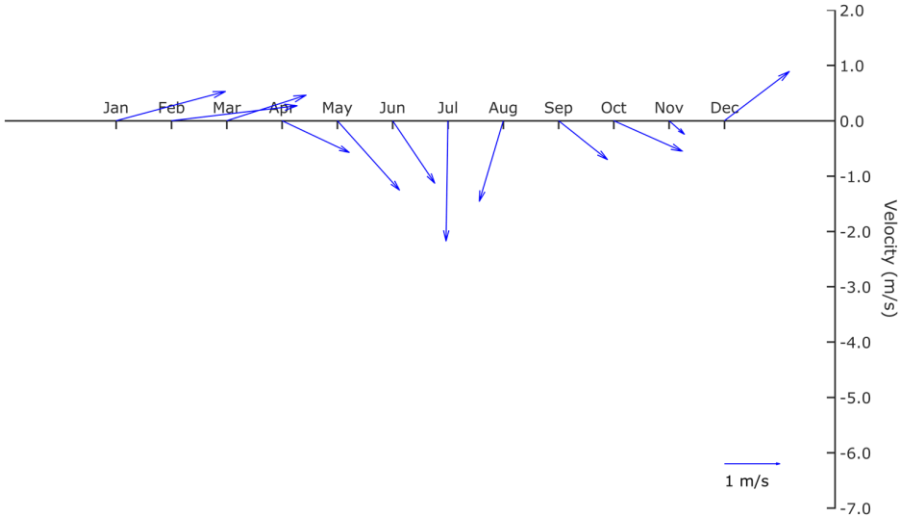
Seasonal near-surface current velocities

3. Results: Overview



Sea Surface Temperature

Mean winds



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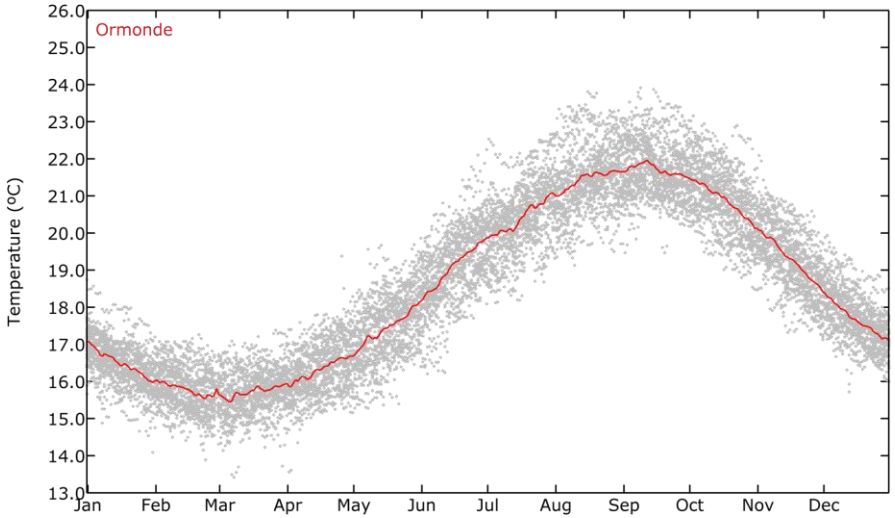
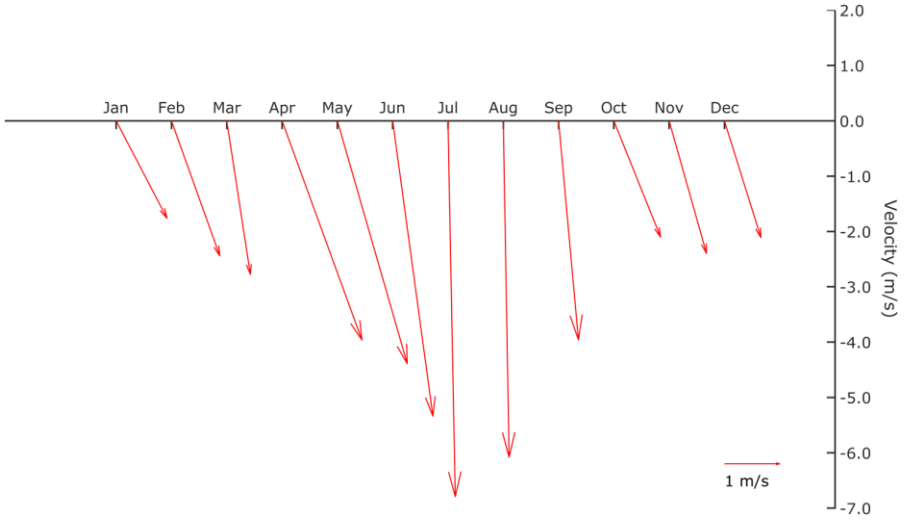
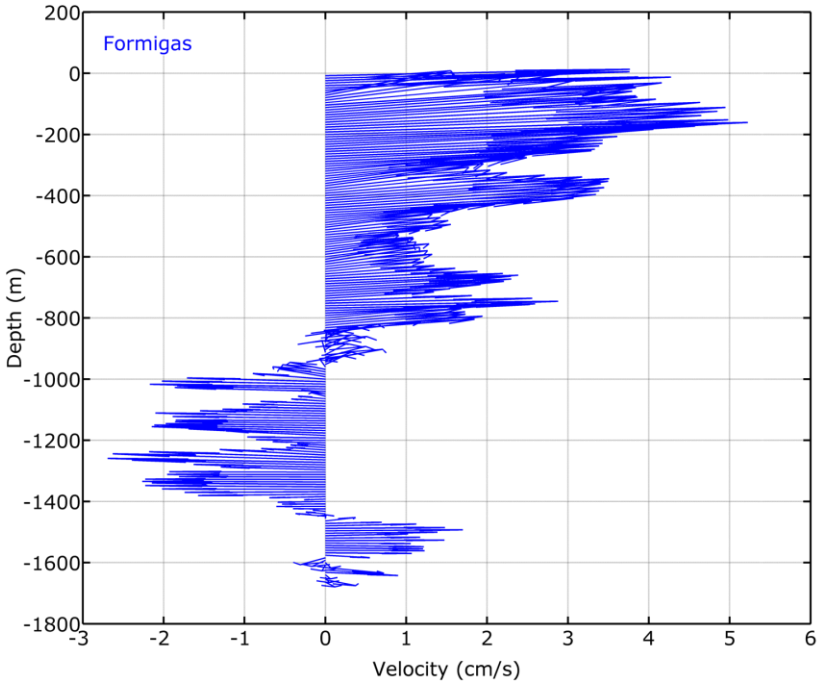


Sea Surface Temperature

Mean winds

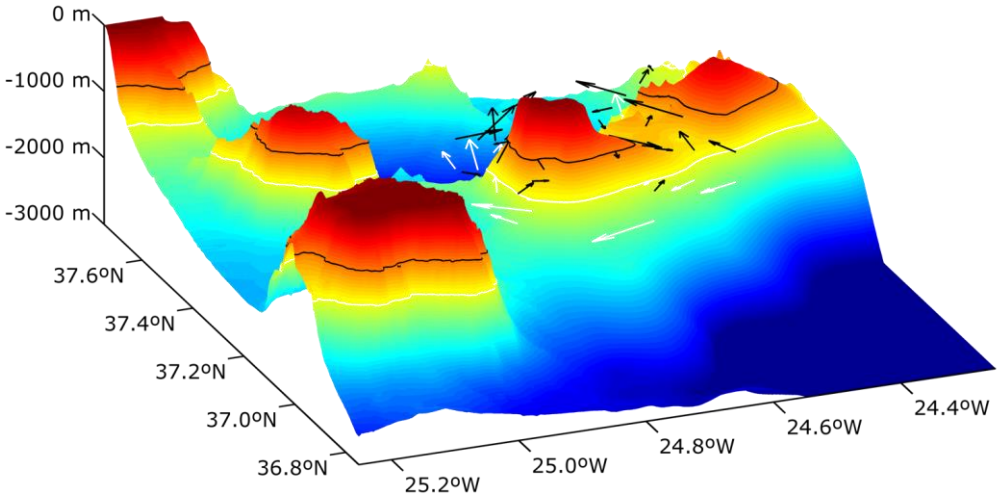


3. Results: Dynamics



Vertical profile of LADCP velocities

Horizontal distribution of LADCP velocities



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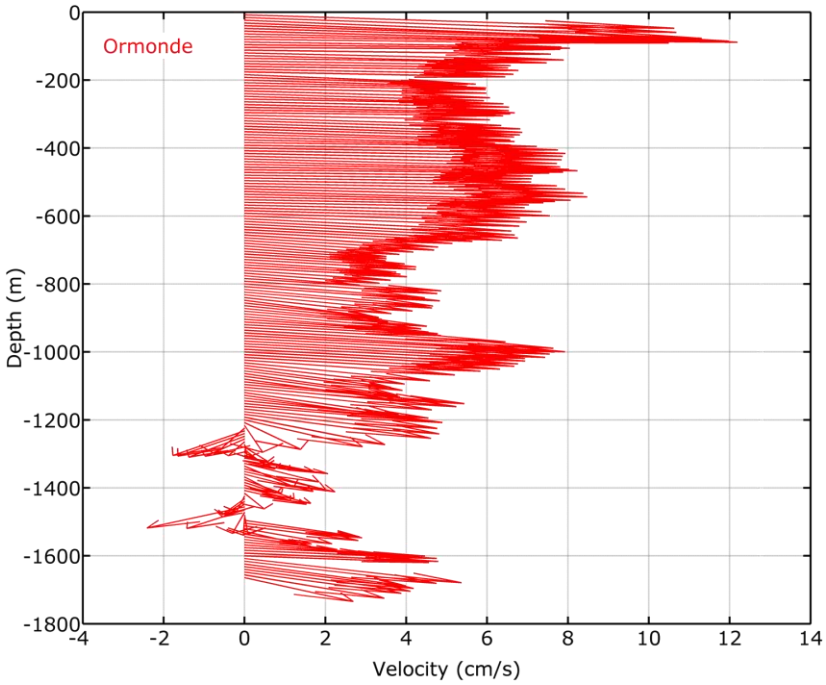

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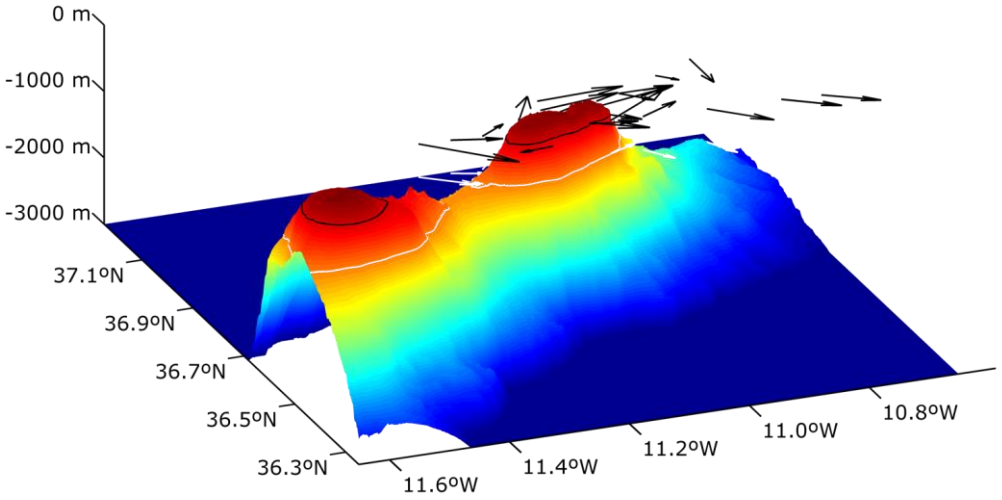

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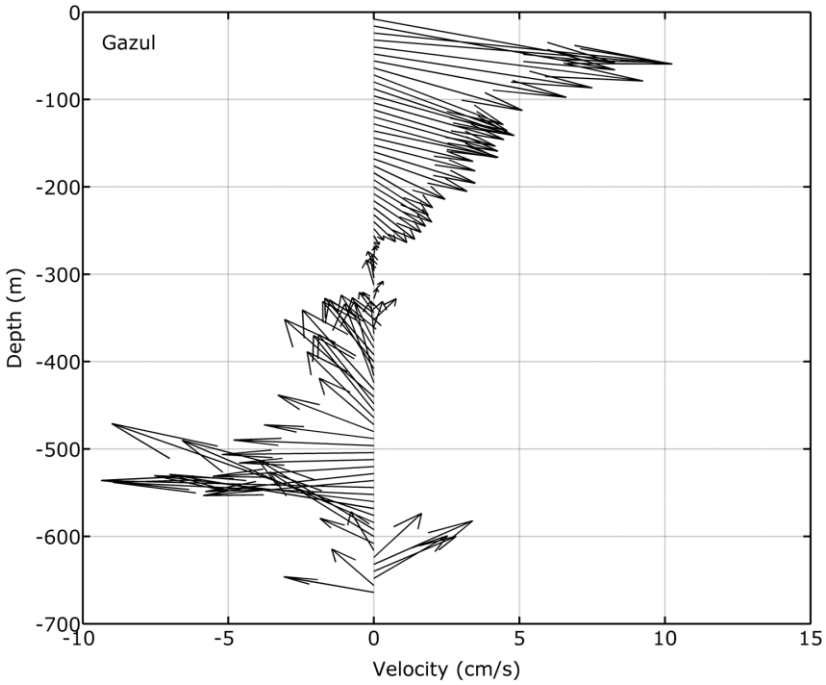

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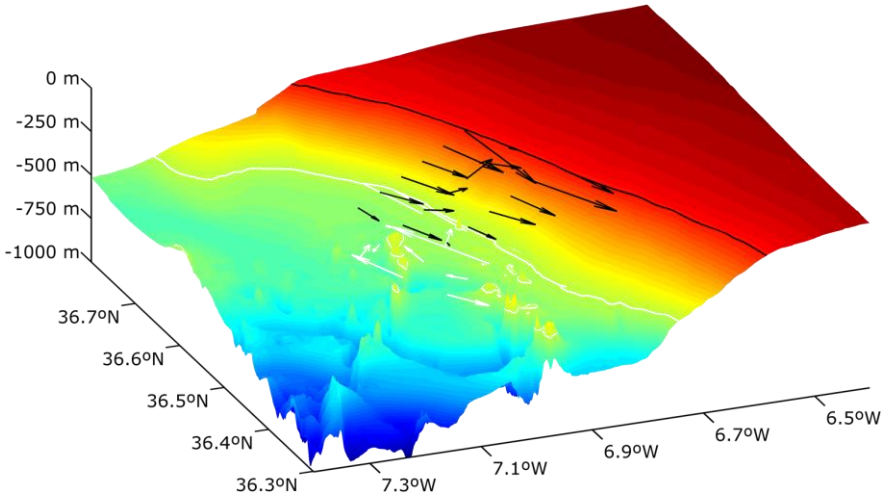


3. Results: Dynamics

To sum up:

- These conditions are not appropriate for the development of Taylor columns.

Our hypothesis:

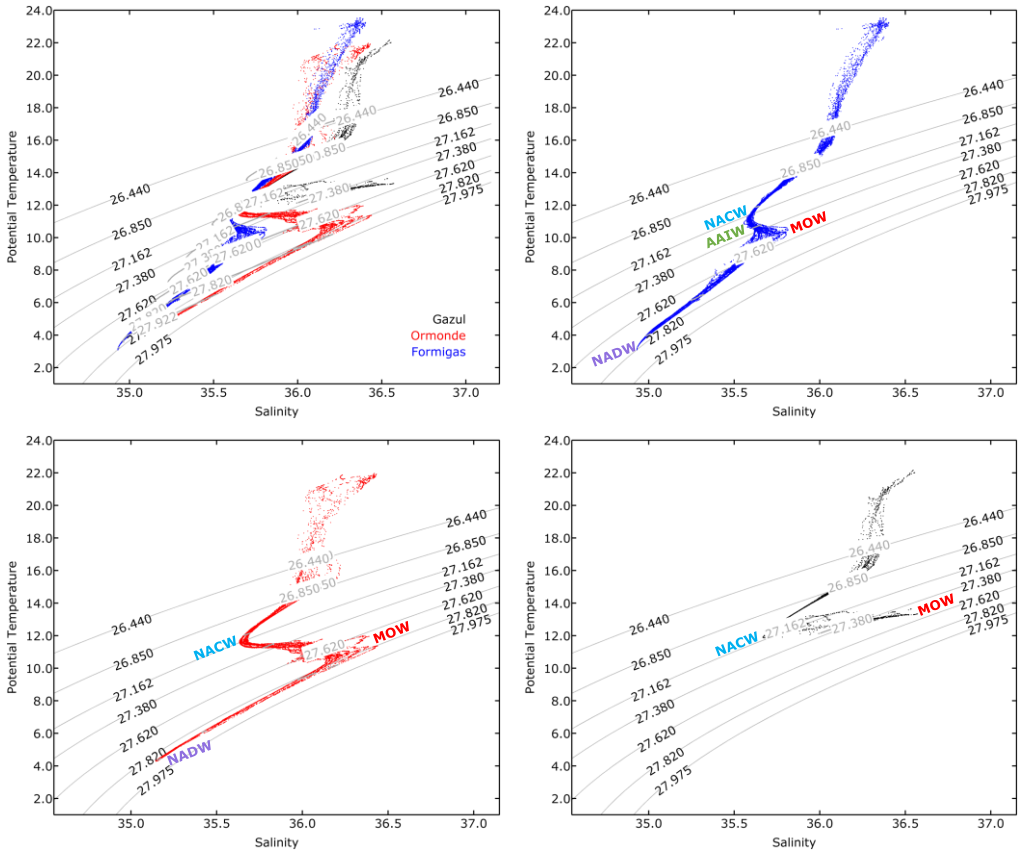
- Cold-water corals in those areas may be mainly affected by:
  - The vertical distribution of the water masses.
  - The variation of the biochemical properties.
  - The effects of internal waves.

3. Results: Hydrography

Formigas
- NACW
- AAIW
- MOW
- NADW

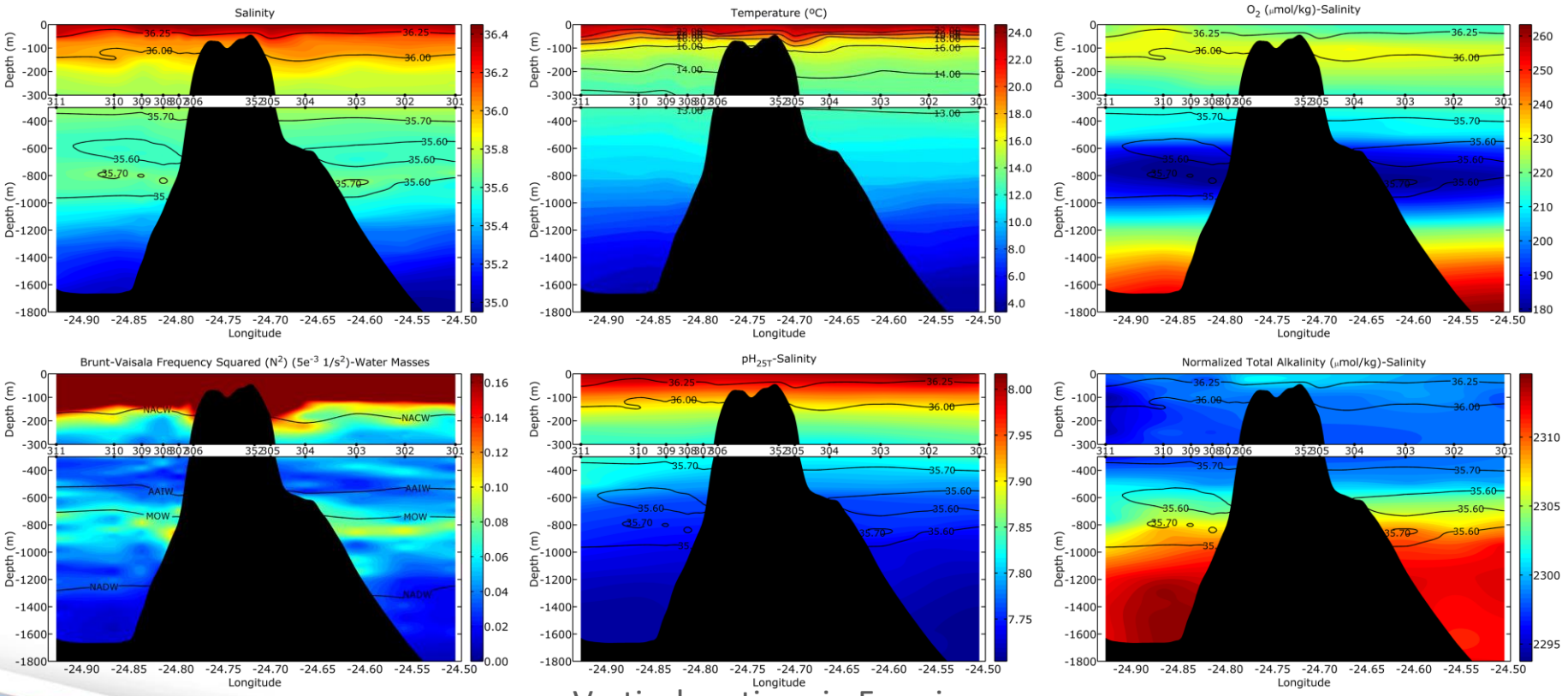
Ormonde
- NACW
- MOW
- NADW

Gazul
- NACW
- MOW



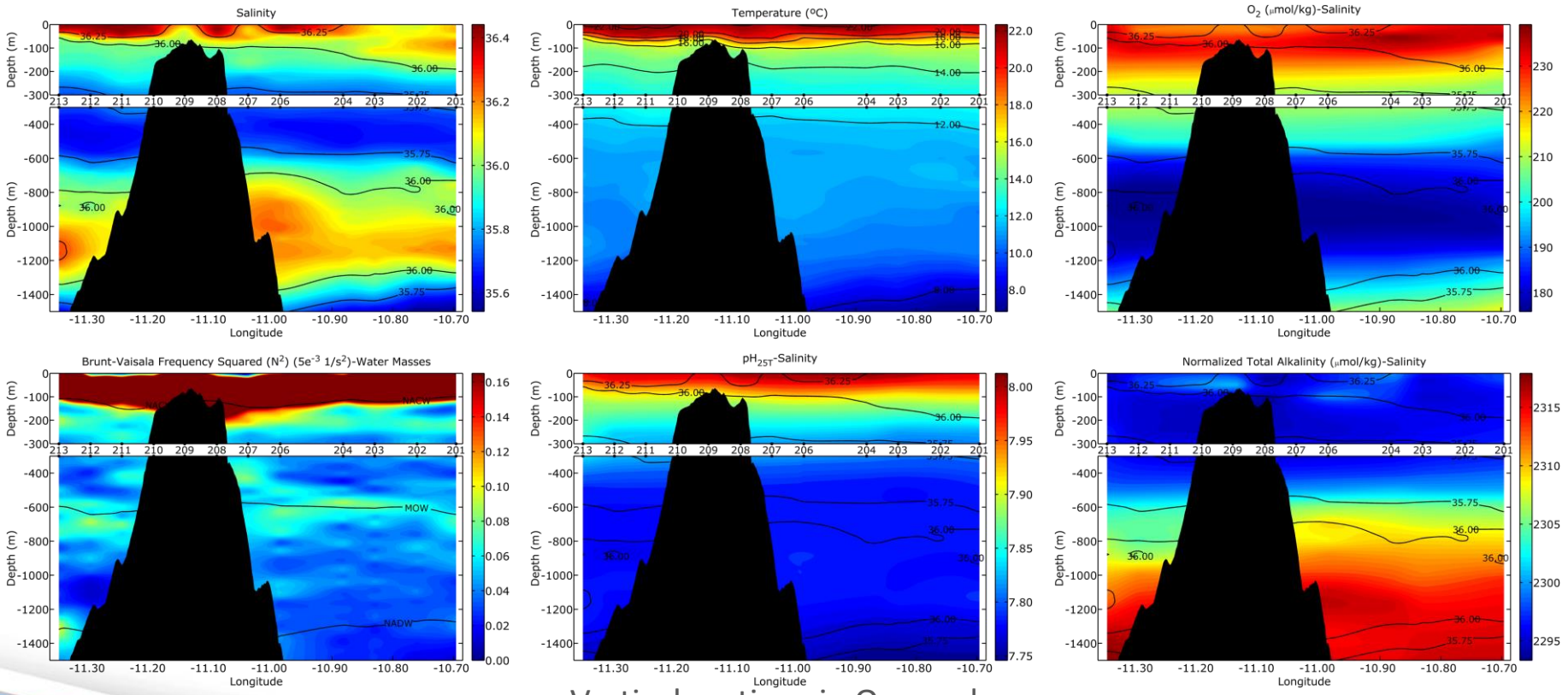
θ/S diagrams

3. Results: Hydrography



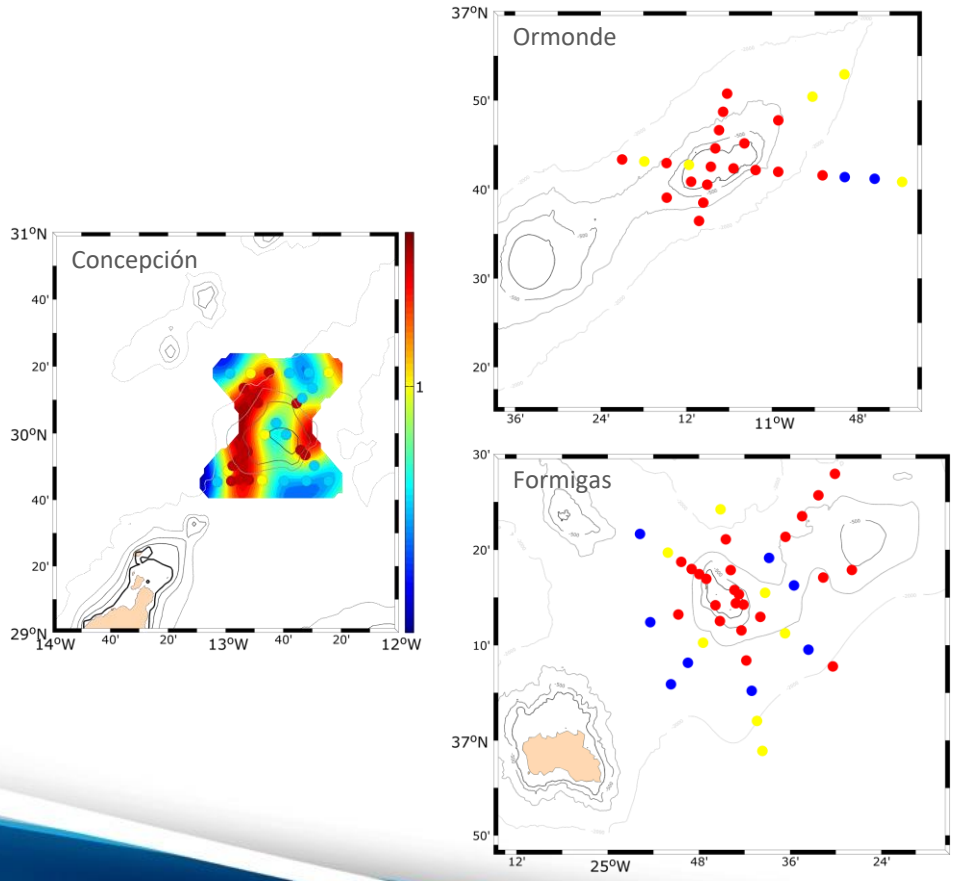
Vertical sections in Formigas

3. Results: Hydrography



Vertical sections in Ormonde

3. Results: Hydrography



Bottom slope vs slope of the characteristic lines (γ). If:

- γ>1 → supercritical (reflective conditions)
- γ≈1 → critical
- γ <1 → subcritical (transmissive conditions)

4. Summary and discussion

The circulation pattern is barely affected by the seamounts.

Taylor columns were not observed in any of the sampled areas.

The vertical distribution of water masses is quite similar in the three regions.

There is a strong gradient between the Atlantic and Mediterranean water properties.

The relatively high values of the Brunt-Väisäla frequency found in the MOW halocline and the steep bottom slope can induce the breaking of internal waves.

Thank You!

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 678760 (ATLAS). This output reflects only the author's view and the European Union cannot be held responsible for any use that may be made of the information contained therein.

Image credit: BGS